

AD-R149 247

HIGH ENERGY PULSED PARTICLE ACCELERATOR(U) MICHIGAN  
UNIV ANN ARBOR DEPT OF NUCLEAR ENGINEERING  
R M GILGENBACH 31 OCT 84 N00014-83-G-0157

1/1

UNCLASSIFIED

F/G 20/7

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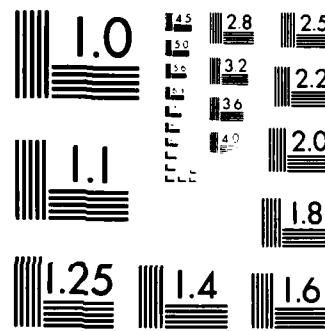
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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Final Report; "High Energy Pulsed Particle Accelerator"		5. TYPE OF REPORT & PERIOD COVERED Final Aug. 1, 1983 to Oct. 31, 1984
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) R. M. Gilgenbach		8. CONTRACT OR GRANT NUMBER(s) N00014-83-G-0157
9. PERFORMING ORGANIZATION NAME AND ADDRESS Nuclear Engineering Dept. University of Michigan Ann Arbor, MI 48109		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
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19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Accelerator, Long-pulse		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number)		
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MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS 1963 A

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This project was performed under the DoD University Instrumentation Program. A state-of-the-art accelerator was designed, constructed, and tested with the following parameters:

Output (working) Voltage: 1 Megavolt;

Pulse length: Adjustable to 1 microsecond from 0.1 microsecond;

Output Energy: At least 10 kJoules in 1 microsecond within voltage flatness;

Current: At least 10 kA into fixed resistance 100 ohm load;

Voltage deviation from flattop: Predicted to be less than  $\pm$  7% voltage fluctuation into variable diode impedance which decreases from 300 ohms to 50 ohms during the 1 microsecond pulse.

Less than  $\pm$  5% total voltage deviation into fixed resistance load of 100 ohms

Unique circuitry was included in the generator to permit electrical compensation for diode impedance droop.

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Office of Naval Research

Final Report/Publications/  
Presentations/Honors

for

1 August 1983 through 31 October 1984

for

Contract N 00014 - 83 - G - 0157

"High Energy Pulsed Particle Accelerator"

R. M. Gilgenbach  
Nuclear Engineering Dept.  
University of Michigan  
Ann Arbor, MI 48109

Classification For	
Ref ID: C&I	<input checked="" type="checkbox"/>
Ref ID: P&P	<input type="checkbox"/>
Uncontrolled	<input type="checkbox"/>
Distribution	
Ev.	
Distribution/	
Availability Codes	
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A-1	



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Acceptance tests: Performed at vendor. Generator tested into 127 ohm fixed impedance to demonstrate peak voltage, voltage deviation from flattop, current/delivered energy, pulse jitter, and voltage falltime. Pulser tested into 200 ohm fixed impedance to demonstrate voltage risetime.

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"High Energy Pulsed Particle Accelerator"

R. M. Gilgenbach  
Nuclear Engineering Dept.  
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Ref ID: CR-1	<input checked="" type="checkbox"/>
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The month of September was spent designing and fabricating electron beam cathodes, anode beam dump and current monitors. Successful electron beam extraction was demonstrated in mid-October. Preliminary results (presented at the 1984 APS Plasma Physics Meeting) demonstrated flat voltage during a ramping current pulse. These initial data were consistent with a diode plasma closure velocity of 2.5 cm/microsecond.

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Faculty/Graduate Students with Research  
Related to this Accelerator

Faculty:

R. M. Gilgenbach, Assoc. Prof.

W. D. Getty, Prof.

M. L. Brake, Asst. Prof.

T. Kammash, Prof.

R. S. Ong, Prof.

J. J. Duderstadt, Prof. and Dean

Graduate Students

Tucker, John

Cheung, Patrick

Horton, Lorne

Lucey, Robert

Cuneo, Michael

Miller, Joel

Meachum, Joseph

Bidwell, Steven

Smutek, Louis

Les, John

Thornhill, Ward

Kensek, Ron.

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Papers Presented at Scientific Conferences

"Microsecond Electron Beam Interactions with Monatomic and Diatomic Gases," R. M. Gilgenbach, L. D. Horton, M. L. Brake, R. F. Lucey, and J. E. Tucker. Presented at the 26th Annual Meeting of the Division of Plasma Physics of the American Physical Society, October 29, 1984, Boston, MA.

Bulletin of the American Physical Society, 29, 1197 (1984).

Honors and Awards, R. M. Gilgenbach

National:

- 1) Presidential Young Investigator (1984-1989)
- 2) Centennial Key to the Future Award (1984)  
from the IEEE Nuclear and Plasma Sciences Society

Patents

None

Refereed Journals and Books

None for this accelerator as of October 1984

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Related to this Accelerator

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Horton, Lorne  
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